

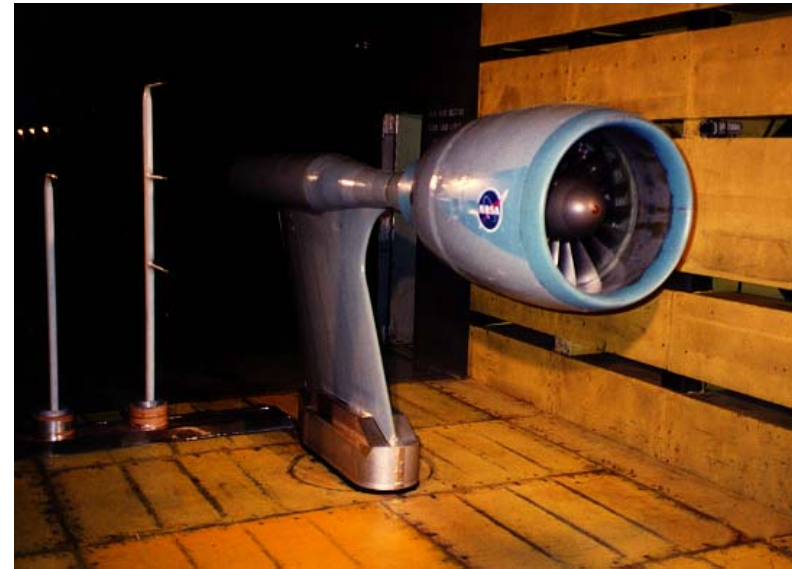


Pressure and Temperature-Sensitive Paint Examples at NASA GRC

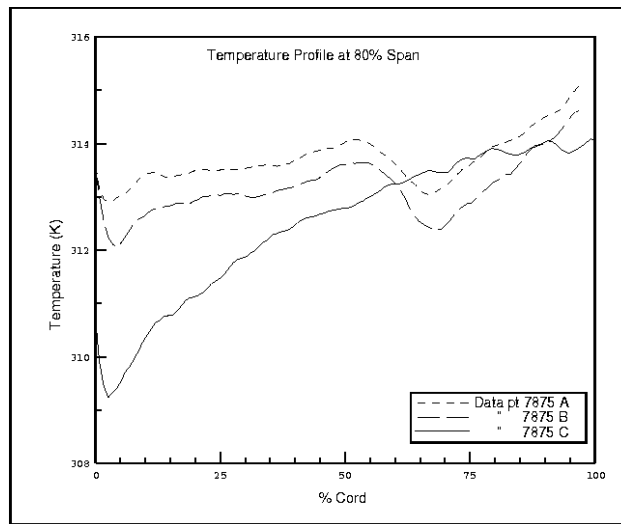
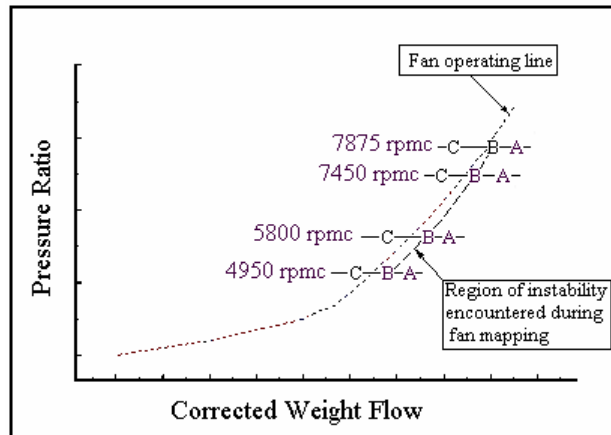
Timothy Bencic

Rotating PSP/TSP on 22" Fan Model

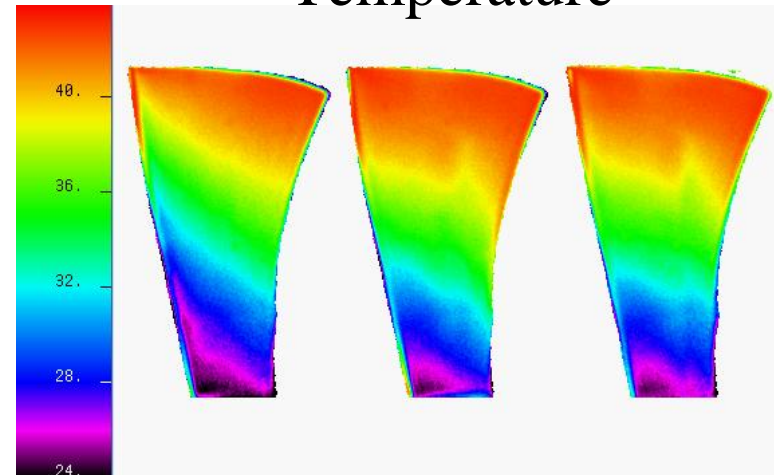
GRC 9'x15'LSWT



Rotating PSP/TSP



Temperature

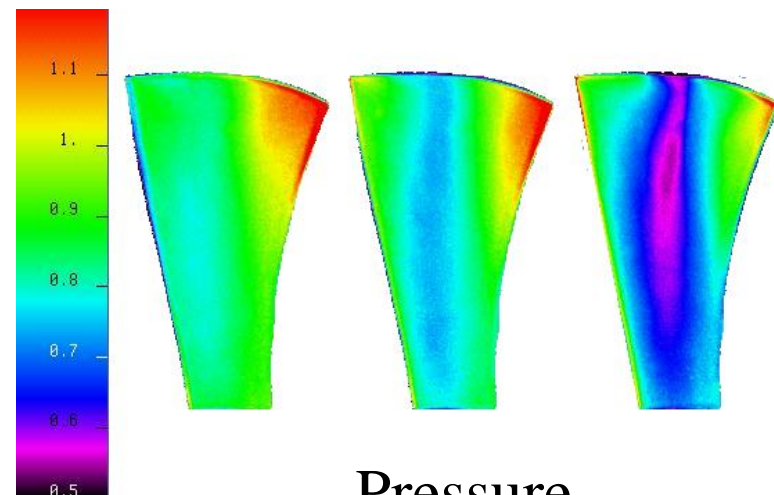


7875 RPM

C

B

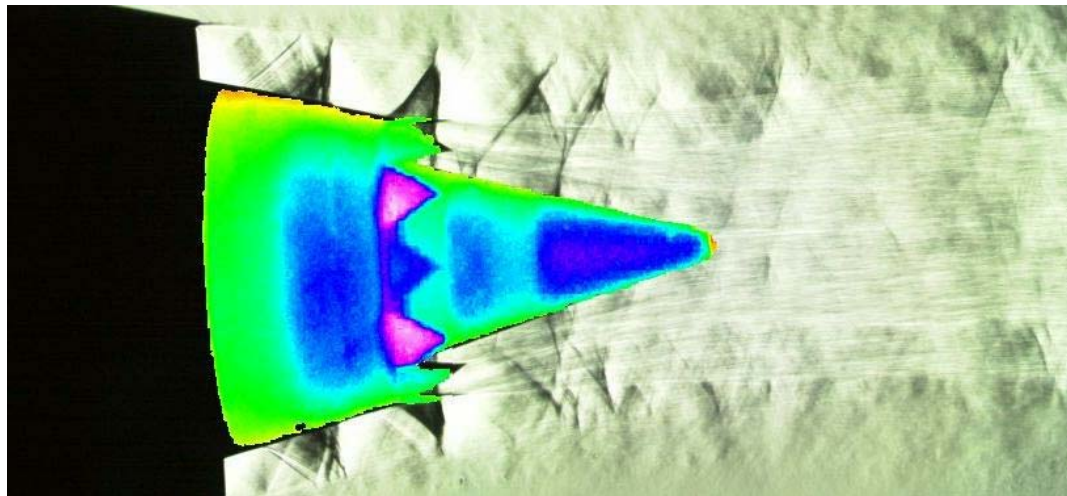
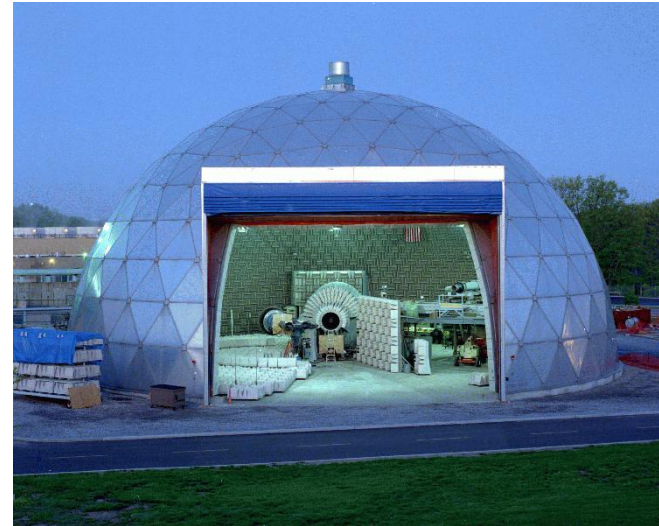
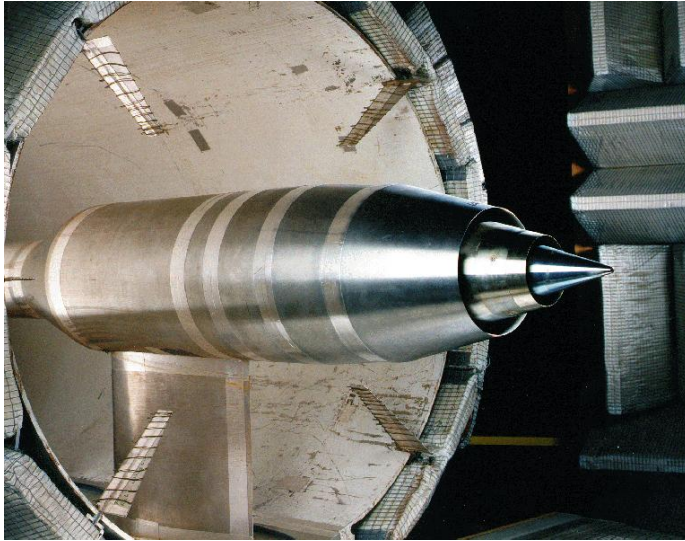
A



Pressure

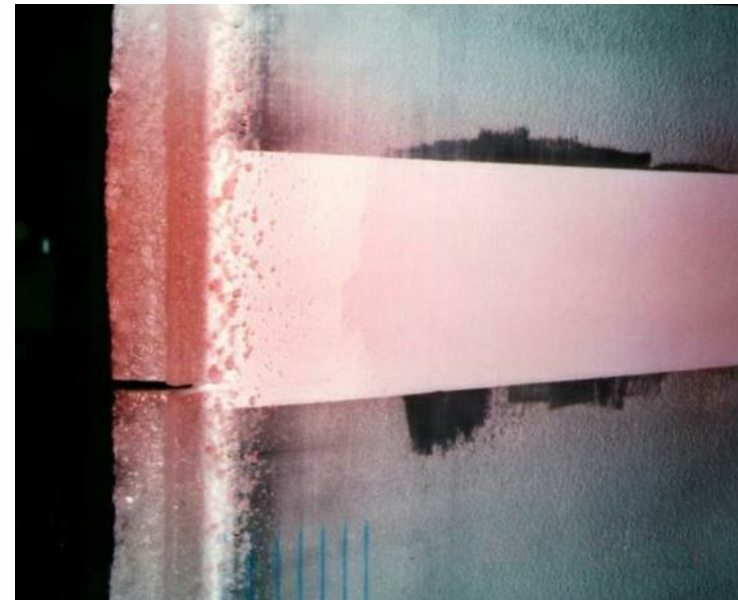
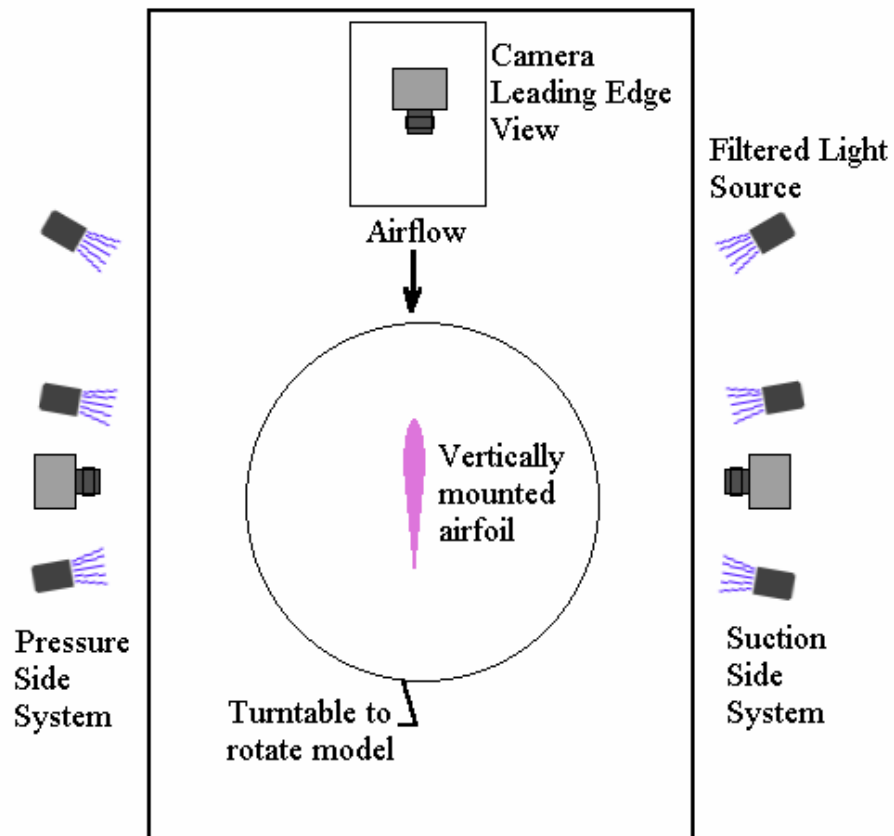


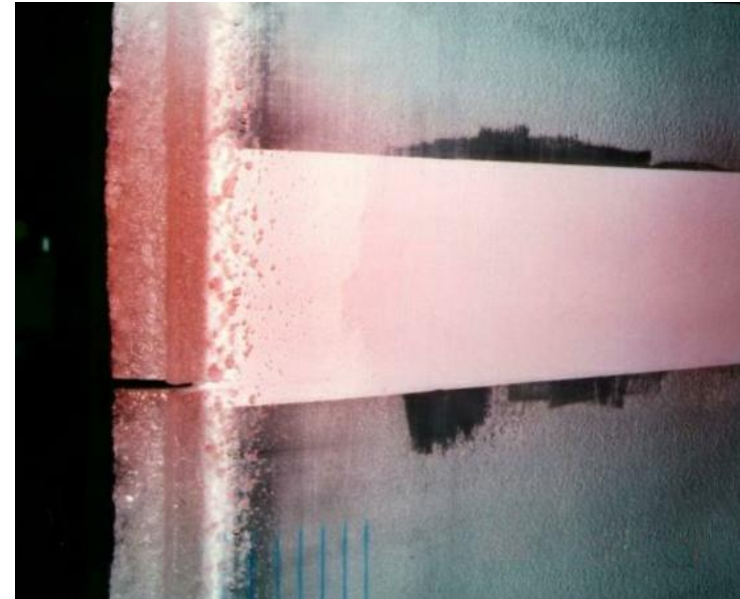
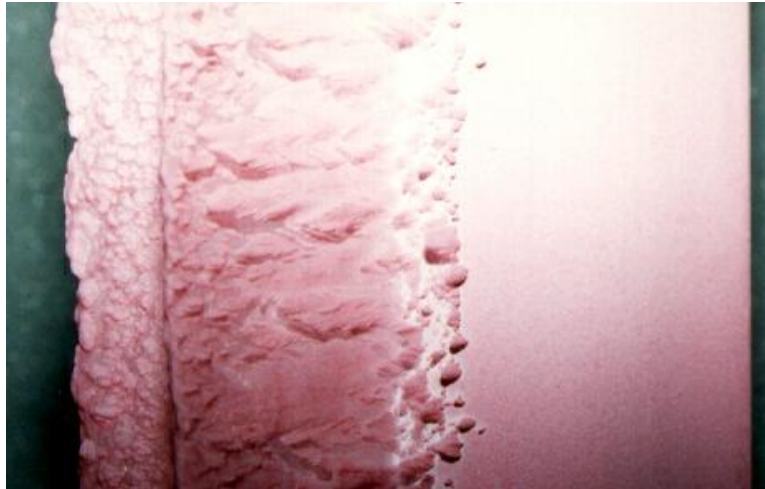
Nozzle Test in APL using Lifetime PSP



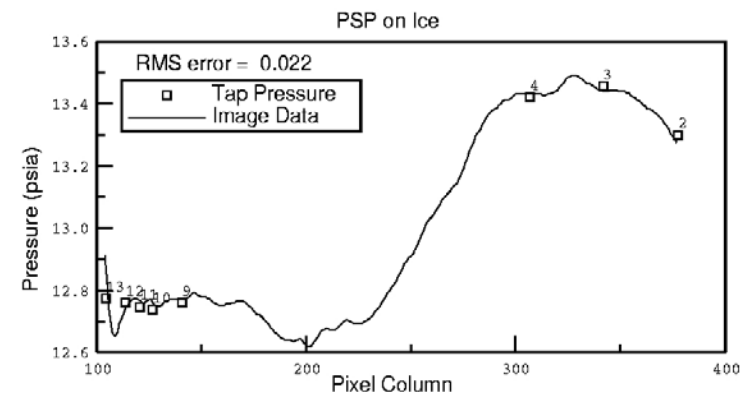
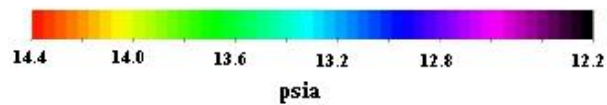
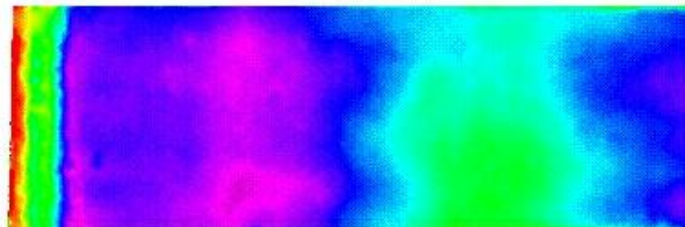
PSP on Ice

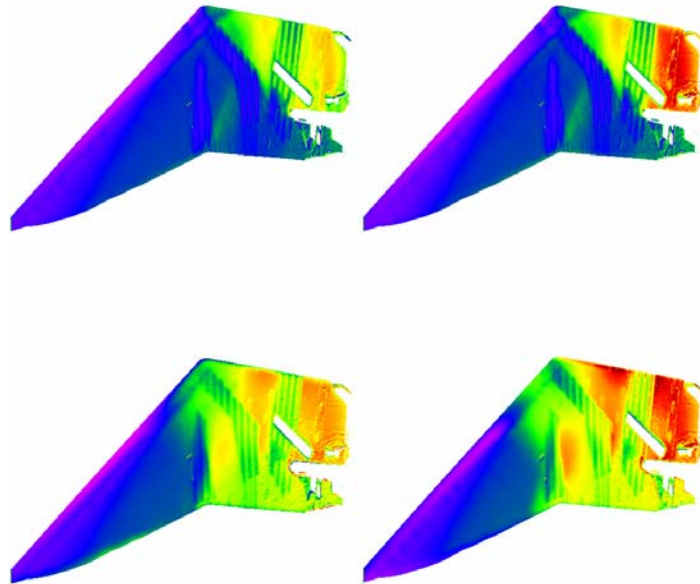
Test setup using PSP on Ice in the IRT



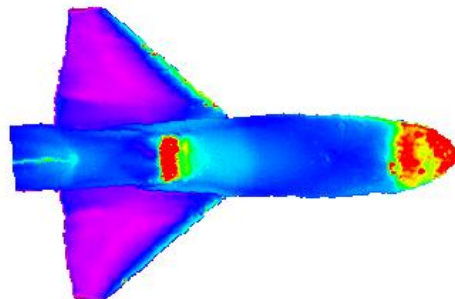


PSP on Ice in the IRT

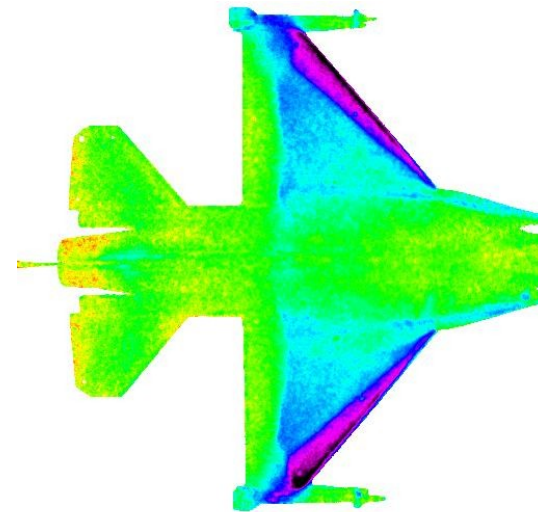




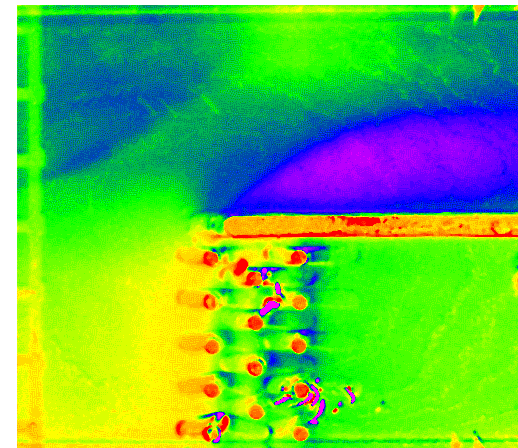
Inlet Test in the 10'X10'



Pioneer Rocketplane in the 1'X1'



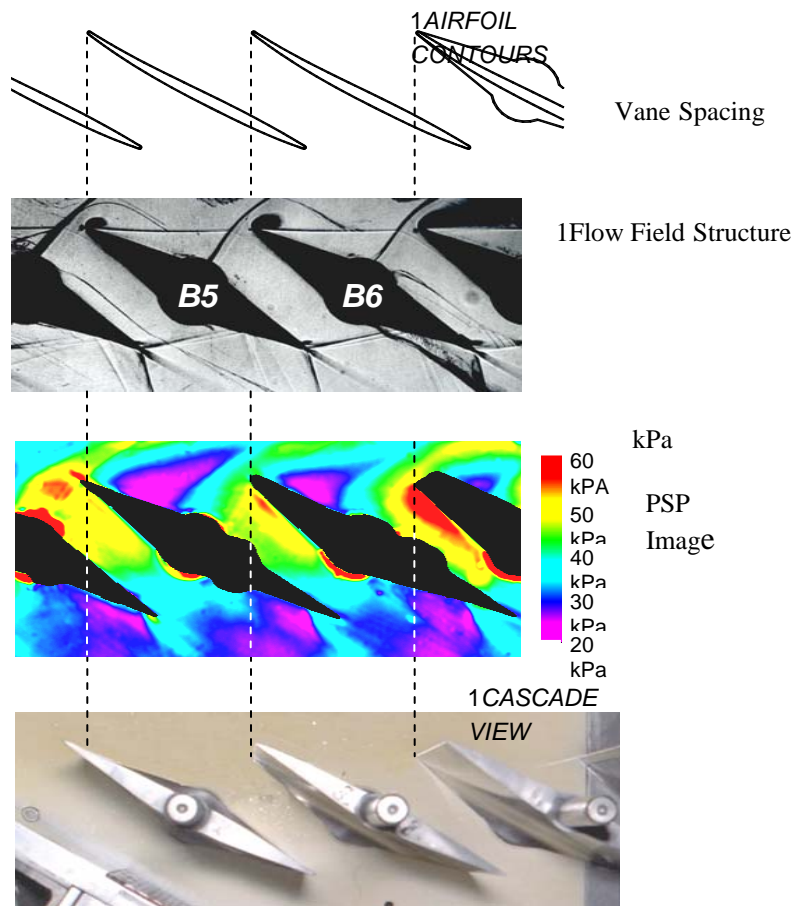
Lifetime PSP F16 Test at ARC



Turbine Cooling Passage
simulation



Transonic Linear Cascade Facility



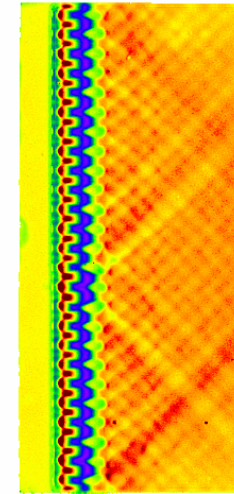
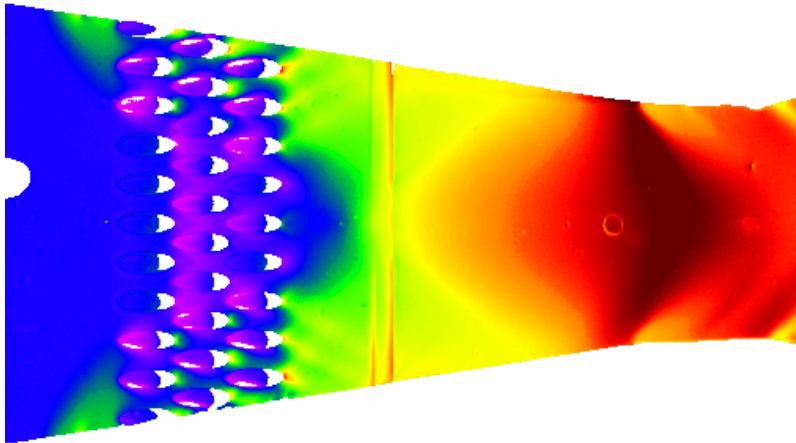
Cascade flow field for Mach number 1.3 showing relation of blades, shocks and pressure profile on the back wall.



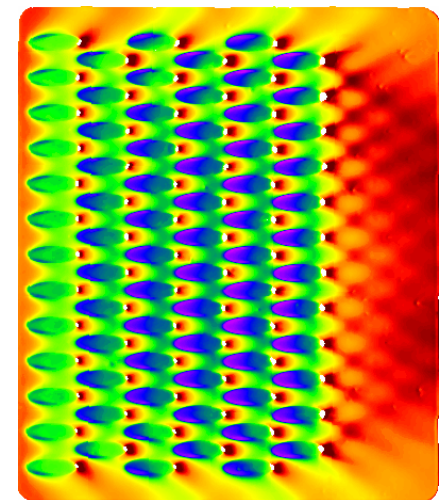
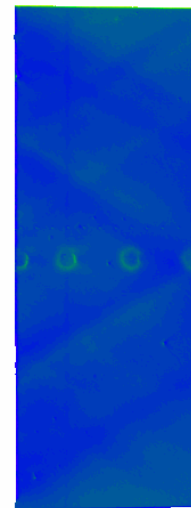
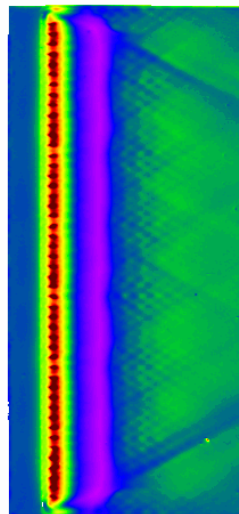
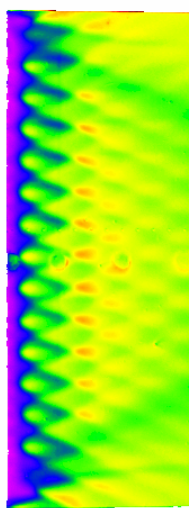
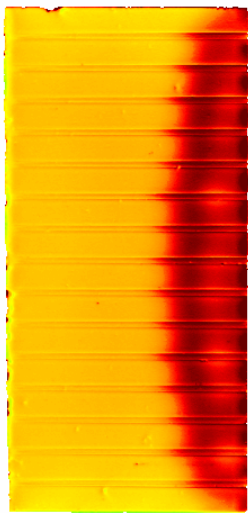
Borescope imaging of confined space surfaces

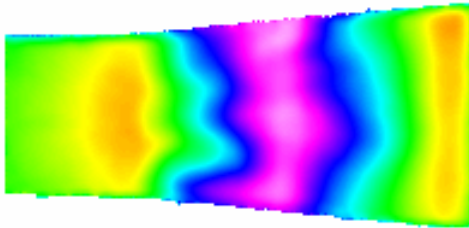


Boundary Layer Control Tests in the 1'X1'SWT

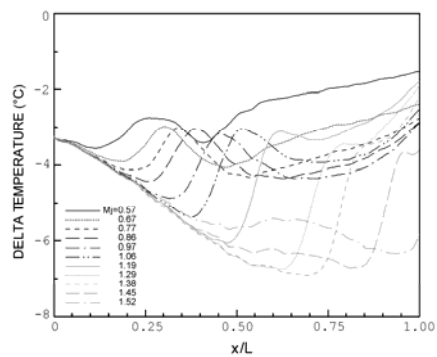


Methods using suction and blowing for boundary layer enhancement

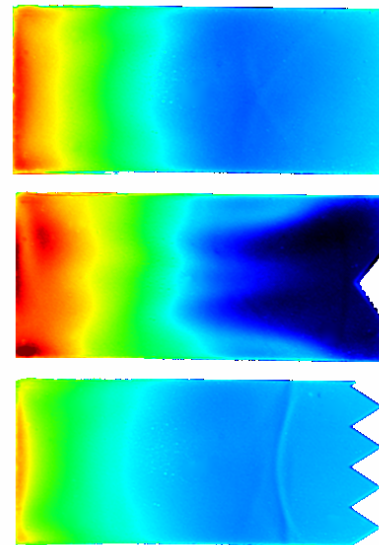




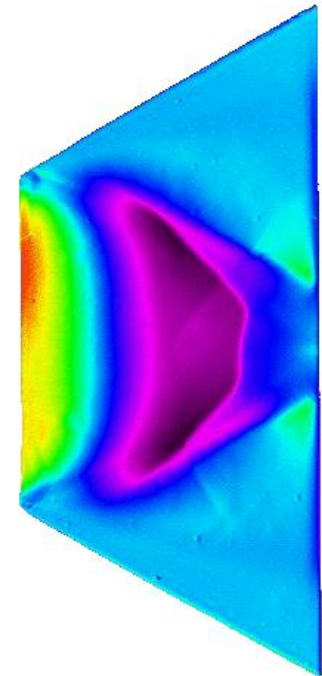
Internal TSP Nozzle Test



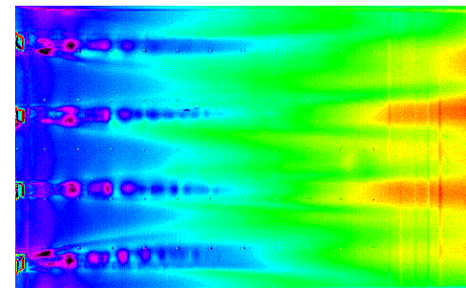
Plot of internal temperature at varying nozzle pressures



Jet-Cavity Interactions



Jet Impingement

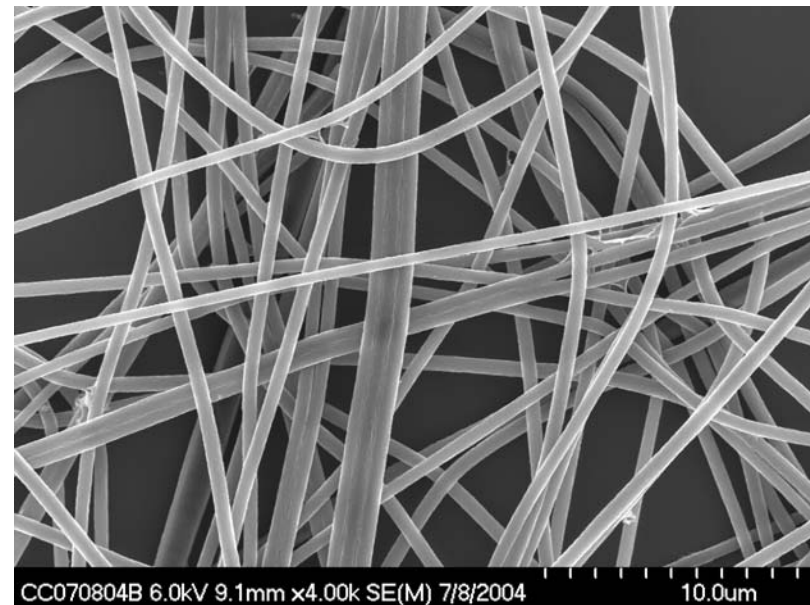
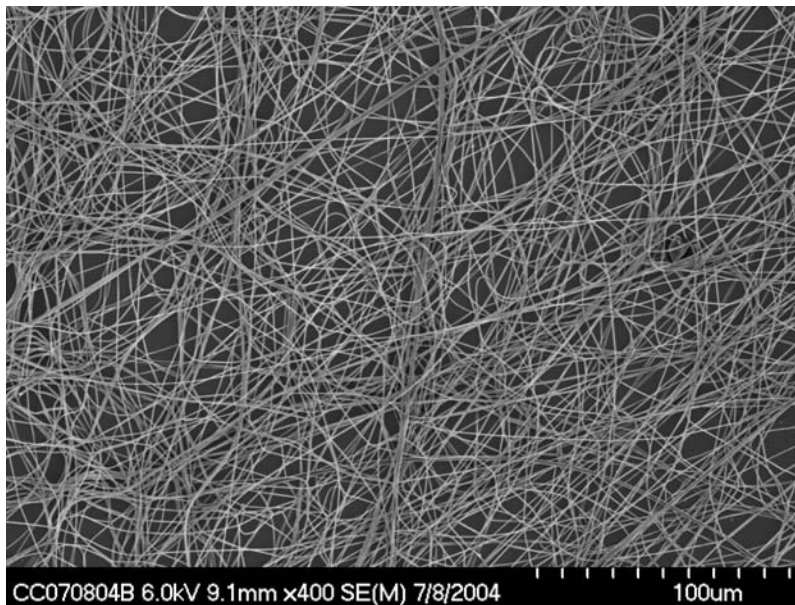


Mixer-Ejector Nozzle



Dynamic PSP Work

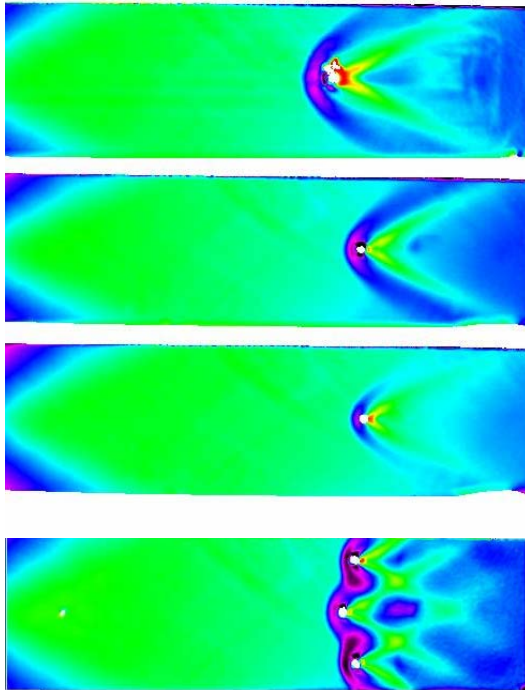
Development of Electrospinning threadlike structures as a fast PSP sensor base



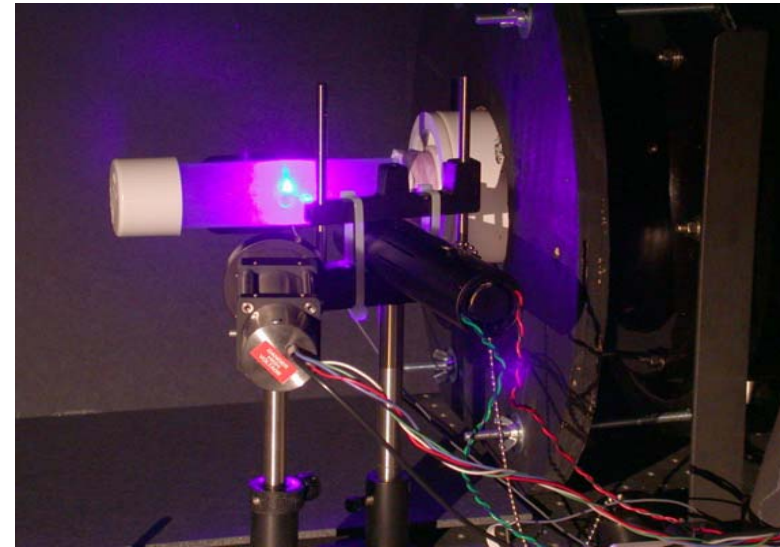
PAN coated with dye



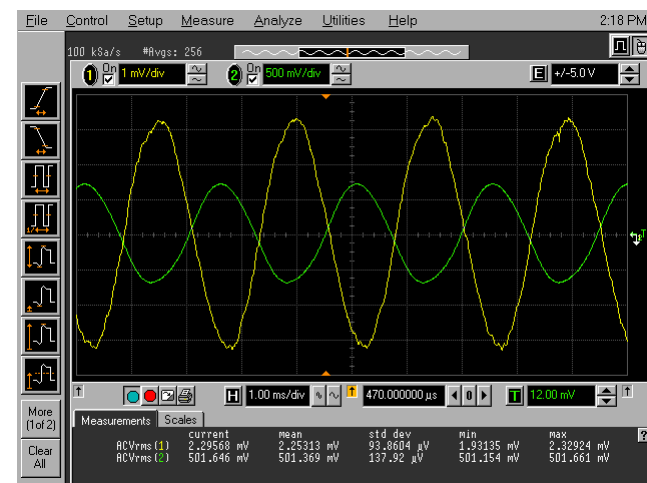
Rotating shocks in supersonic flow



Dynamic PSP Work

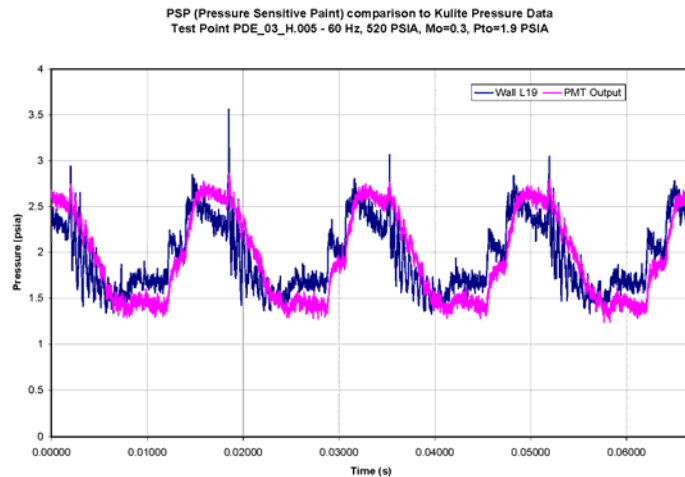


Standing wave tube



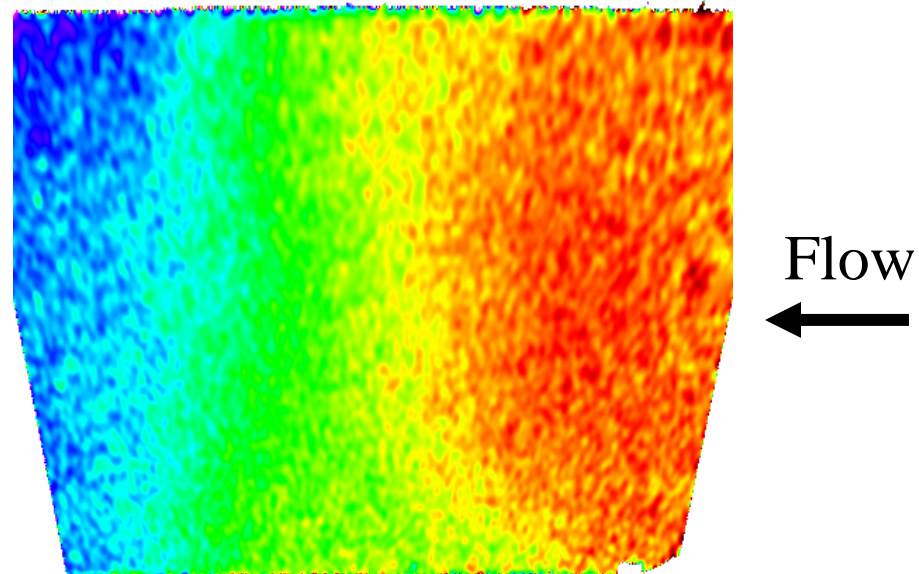


Dynamic PSP Test: Pulse Detonation Engine Sidewall



Point PSP measurements
vs pressure transducer,
paint has lag and $\sim 1\text{kHz}$
response

Instantaneous image of pressure
field of moving pressure wave



Low

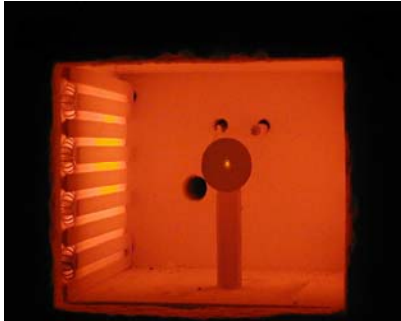
Pressure

High

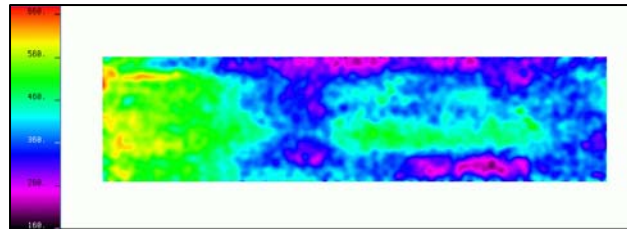


High temperature TSP

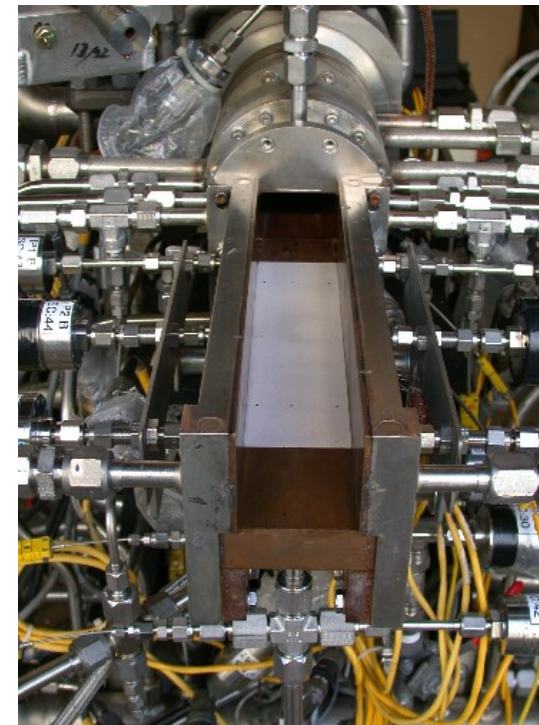
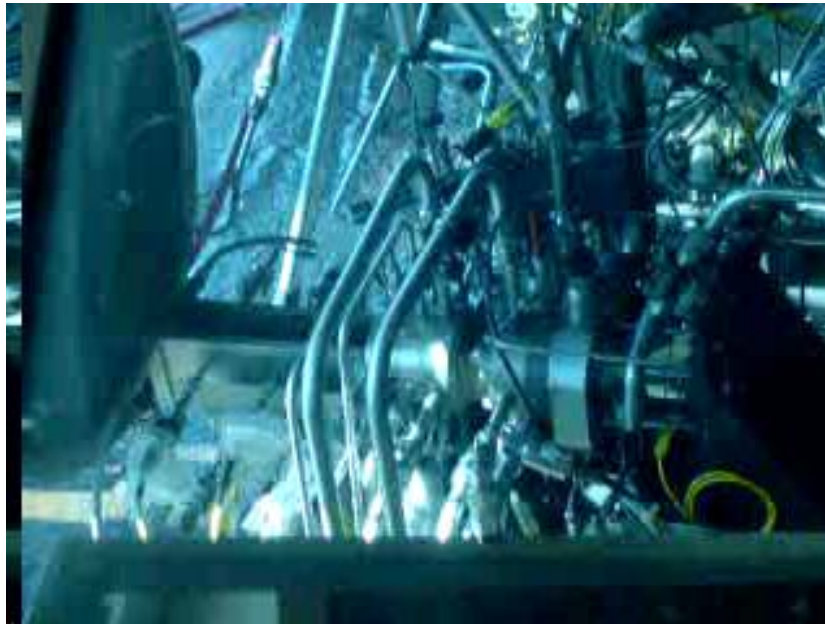
Sprayable coating with phosphor that withstands 1500°C
Data acquisition uses multi-gate lifetime techniques

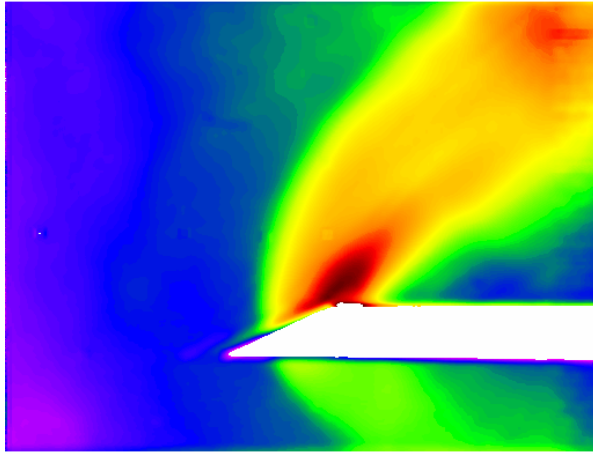


Calibration in furnace

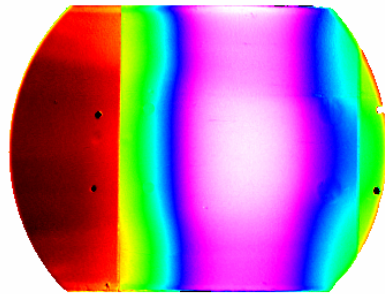


Cooled panel rocket testing

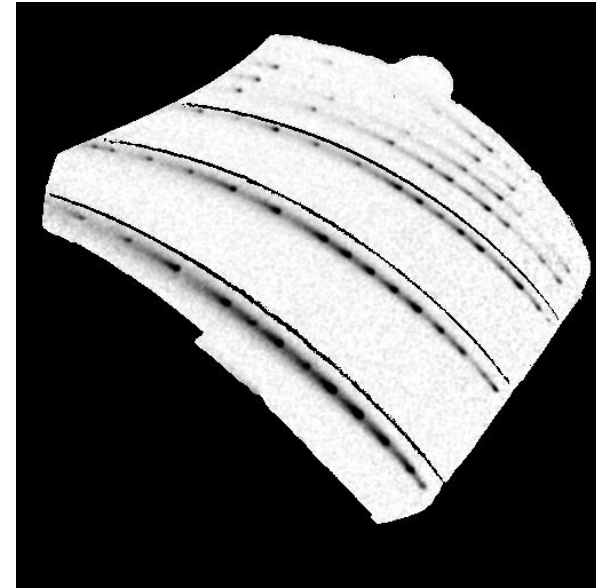




Shock Interaction Test



TSP Heat Transfer Test



Large Low-speed
Compressor PSP Flow
visualization Test
using N_2 injection



Erosion Depth Indication by Luminescence of Layered Dopants in Thermal Barrier Coatings

160 μm thick EB-PVD layer doped 7YSZ

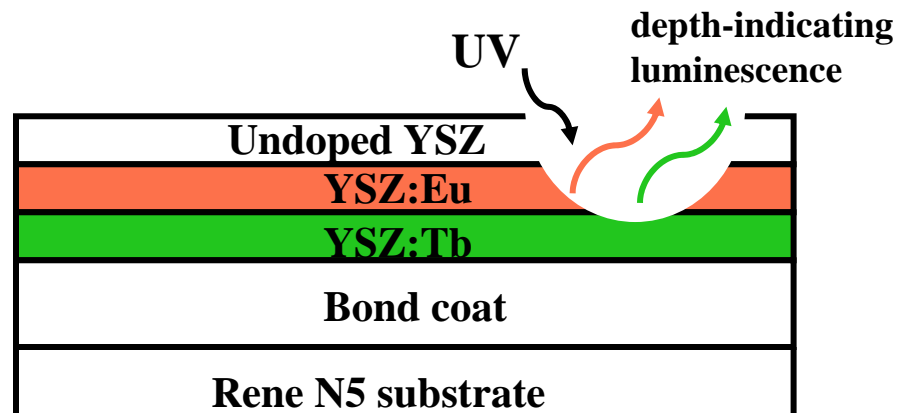


visible illumination



UV illumination

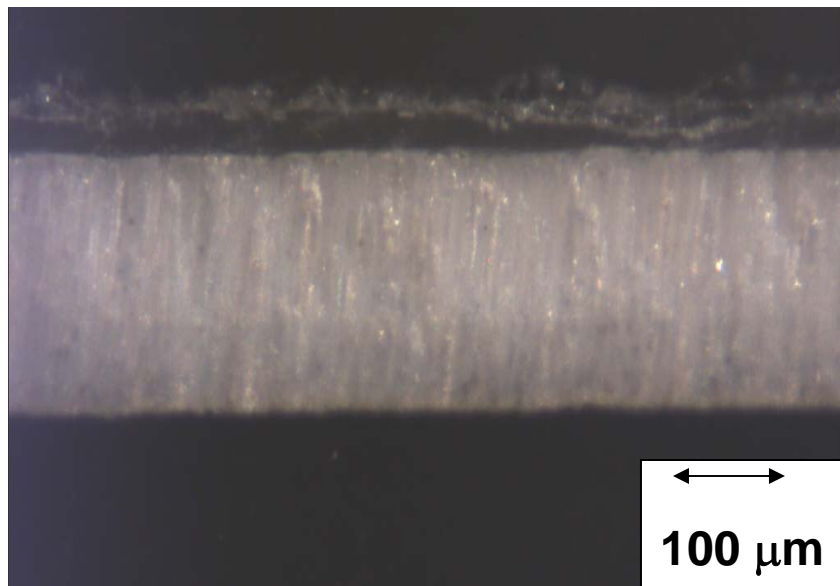
1 cm



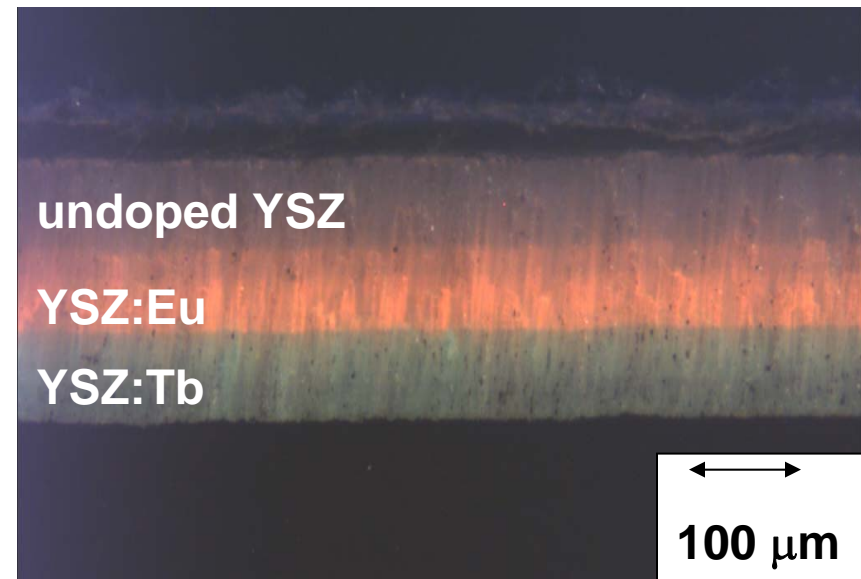


Cross-section View of Erosion-Indicating Luminescent Layers

160 μm thick EB-PVD layer doped 7YSZ



visible illumination



UV illumination